CHAPTER 1

SIMPLE EQUATIONS

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SIMPLE EQUATIONS

1.0 INTRODUCTION

In this chapter, we shall study the meaning of an equation and also that of a linear equation. We shall also discuss the meaning of the solution of a linear equation and two methods of obtaining it. One by trial-and-error and another by a systematic method involving addition, subtraction, multiplication or division of some non-zero number on both sides of the equation.

2.0 EQUATIONS

A statement of equality which involves one or more literals (variables) is called an equation.Every equation has two sides, namely, the left hand side (written as L.H.S.) and the right hand side (written as R.H.S.)

In the equation $x + 3 = 8$, $x+3$ is L.H.S. and 8 is R.H.S, whereas in the equation $\frac{x}{4} = 3$, $\frac{x}{4}$ is L.H.S. and 3 is R.H.S. In the equation $x^2 = 5 + x$, x^2 is L.H.S. and $5 + x$ is R.H.S. The literal numbers involved in an equation are called variables or unknowns. Usually the variables are denoted by letters from the later part of the English alphabet, e.g.x,y,z,v,u,w etc.

An equation may contain any number of variables. The equation $x^2 - x = 5$ has only one variable whereas in equation $2x - 3y = 5$ there are two variables x and y.

3.0 LINEAR EQUATIONS

In the previous section, we have studied that an equation may involve any number of variables and the exponents or indices of the variables may be one or more than one. The nomenclature of the equations depends on the highest power of the variable(s) involved.

An equation in which the highest power of the variables involved is 1, is called a linear equation.

For example, equation. $3x - 7 = 5$, $\frac{x}{4} + 5 = 3$, $3x - 2y = 7$ and $\frac{x}{2} + \frac{y}{3} = 4$ are linear equations.

The equations $2x^2 + x = 1$, $y + 5 = y^2$ and $x^3 = 8$ are not linear equations, because the highest power of the variable in each equation is greater than one.

In this chapter, we shall study linear equations in one variable only.

4.0 SOLUTION OF AN EQUATION

Consider the linear equation

$x - 10 = -7$ ......(i)

L.H.S. of (i) is $x - 10$ and its R.H.S. is -7.

Let us now evaluate the L.H.S. and R.H.S. for some values of the variables x .

x	L.H.S.	R.H.S.
1	$1 - 10 = -9$	-7
2	$2 - 10 = -8$	-7
3	$3 - 10 = -7$	-7

From the above table, we observe that the L.H.S. equals the R.H.S. only when we substitute 3 for x. For all other values of x, the two sides are not equal. In other words, the equation is satisfied by $x = 3$. Such a value of the variable is called the solution or root of the equation as defined below.

SOLUTION A number, which when substituted for the variable in an equation, makes L.H.S. = R.H.S., is said to satisfy the equation and is called a solution or a root of the equation.

Illustrations

Illustration 1. Write the L.H.S. and the R.H.S. of each of the following equations:

(i) $x - 3 = 5$ (ii) $3x = 15 - 2x$

(iii) $3x = 21$ (iv) $3x - 4y = 9 + x$

Solution

Equation	**L.H.S.**	**R.H.S.**
(i) $x - 3 = 5$	$x - 3$	5
(ii) $3x = 15 - 2x$	$3x$	$15 - 2x$
(iii) $3x = 21$	$3x$	21
(iv) $3x - 4y = 9 + x$	$3x - 4y$	$9 + x$

Illustration 2. Verify that $x = 3$ is the solution of the equation $2x - 3 = 3$

Solution Putting $x= 3$ on L.H.S., we have

L.H.S. $= 2 \times 3 - 3 = 6 - 3 = 3$

And, R.H.S. $= 3$

Thus, for $x = 3$, we have L.H.S. = R.H.S.

Hence, $x = 3$ is the solution of the given equation.

5.0 SOLVING LINEAR EQUATIONS

In the previous section, we have studied the meaning of the solution or root of an equation. Note that solving an equation means determining its roots, You will study in higher classes that a linear equation has only one root. Thus, solving a linear equation means finding its root. In this section, we shall study three methods of solving a linear equation:

(i) By trial-and-error method.

(ii) Systematic method

(iii) Transposition method.

Let us discuss these methods one by one.

5.1 Trial and error method

In this method, we often make a guess of the root of the equation. We find the values of L.H.S. and R.H.S.of the given equation for different values of the variable. The value of the variable for which L.H.S = R.H.S. is the root of the equation.

Illustrations

Illustration 3. Solve the following equations by the trial-and-error method;

(i) $x + 7 = 10$ (ii) $x - 15 = 20$ (iii) $5x = 30$

Solution Let us evaluate the L.H.S. and R.H.S. of each of the given equations for some values of x and continue to give new values till the L.H.S. becomes equal to the R.H.S.

(i) The given equation is $x + 7 = 10$. We have, L.H.S = $x + 7$ and R.H.S. = 10.

x	**L.H.S.**	**R.H.S.**	**Is L.H.S. = R.H.S. ?**
1	$1 + 7 = 8$	10	NO
2	$2 + 7 =9$	10	NO
3	$3 + 7 = 10$	10	YES

Clearly, L.H.S. = R.H.S. for $x = 3$.

Hence, $x = 3$ is the solution of given equation.

(ii) The given equation is x – 15 = 20, that is, 15 subtracted from x gives 20. So, we substitute values greater than 20. We have L.H.S. = x – 15, R.H.S. = 20.

x	L.H.S.	R.H.S.	Is L.H.S. = R.H.S. ?
25	25 – 15 =10	20	NO
30	30 – 15 = 15	20	NO
34	34 – 15 = 19	20	NO
35	35 – 15 = 20	20	YES

Clearly, L.H.S. = R.H.S. for x = 35.
Hence, x = 35 is the solution of the given equation.

(iii) The given equation is 5x = 30. We have L.H.S. = 5x and R.H.S.= 30. Now,

x	L.H.S.	R.H.S.	Is L.H.S. = R.H.S. ?
1	5 × 1 = 5	30	NO
2	5 × 2 = 10	30	NO
3	5 × 3 = 15	30	NO
4	5 × 4 = 20	30	NO
5	5 × 5 = 25	30	NO
6	5 × 6 = 30	30	YES

Clearly, L.H.S. = R.H.S. for x = 6.
Hence, x = 6 is solution of the given equation.

5.2 Systematic method

We have learnt about the trial-and-error method of solving linear equations in one variable. As we have seen that this method is time consuming and is not always direct.

In fact, it is a crude method. In the following discussion we shall study a better method of solving linear equations.

An equation can be compared with a weighing balance. The two sides of an equation are two pans and the equality symbol '=' tells us that the two pans are in balance as shown in Fig.1.1(i)

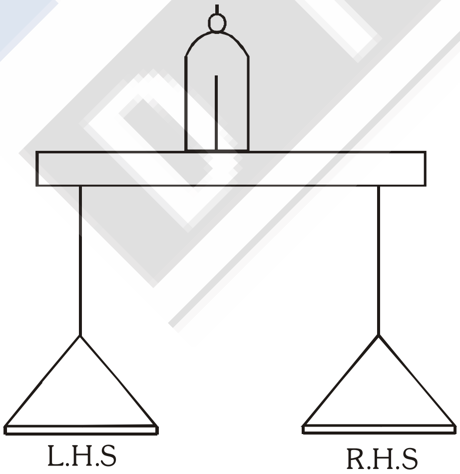

Fig. 1.1(i)

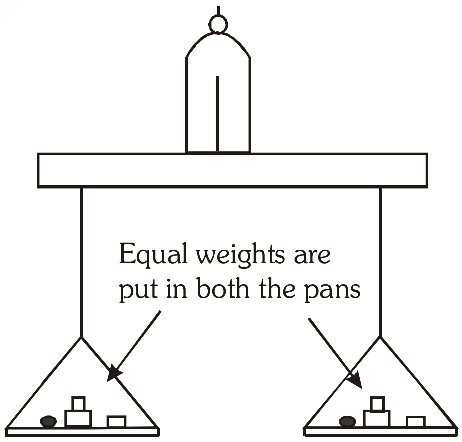

Fig. 1.1(ii)

All of us are familiar with the working of a balance. If equal weights are put in the two pans, we observe that the two pans remain in balance as shown in Fig.1.1 (ii)

If we remove equal weights from both the pans, we find that the pans still remain in balance as shown in Fig.1.2

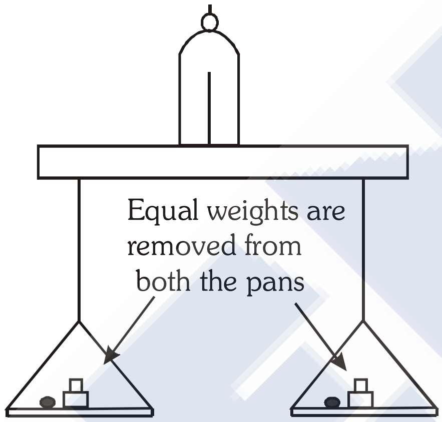

Fig. 1.2

Since multiplying a number by 4 (say) means adding it four times and dividing a number by 3 means subtracting the same number 3 times from it. Thus, the pans will still remain undisturbed if we multiply or divide the weights in two pans by the same quantity.

Similarly, in the case of an equation, we have the following rules:

Rule 1 We can add the same number to both sides of the equation, i.e. if $x + 5 = 7$, then $x + 5 + 2 = 7 + 2$.

Rule 2 We can subtract the same number from both sides of the equation, i.e., if $x + 5 = 7$, then $x + 5 - 2 = 7 - 2$.

Rule 3 We can multiply both sides of the equation by the same non-zero number, i.e., if $\frac{x}{3} = 4$, then $\frac{x}{3} \times 6 = 4 \times 6$. Also, $\frac{x}{3} \times 3 = 4 \times 3$.

Rule 4 We can divide both sides of the equation by the same non-zero number, i.e., if $3x = 10$, then $\frac{3x}{3} = \frac{10}{3}$. Also, $\frac{3x}{5} = \frac{10}{5}$.

Illustrations

Illustration 4. Solve the equation $x - 3 = 5$ and check the result.

Solution We have, $x - 3 = 5$.

In order to solve this equation, we have to get x by itself on the L.H.S. To get x by itself on the L.H.S., we need to shift –3. This can be done by adding 3 to both sides of the given equation.

$x - 3 = 5$

$\Rightarrow$ $x - 3 + 3 = 5 + 3$ [Adding 3 to both sides]

$\Rightarrow$ $x + 0 = 8$ [$\because$ $-3 + 3 = 0$ and $5 + 3 = 8$]

$\Rightarrow$ $x = 8$ [$\because$ $x + 0 = x$]

So, $x = 8$ is the solution of the given equation.

Check : Substituting $x = 8$ in the given equation, we get

L.H.S. $= 8 - 3 = 5$ and, R.H.S. $= 5$.

Thus, when $x = 8$, we have L.H.S. = R.H.S.

Illustration 5. Solve the equation x + 4 = – 2 and check the result.

Solution In order to solve this equation, we have to obtain x by itself on L.H.S. To get x by itself on L.H.S., we need to shift 4. This can be done by subtracting 4 from both sides of the given equation.

Thus, $x + 4 = -2$

$\Rightarrow \quad x + 4 - 4 = -2 - 4$ [Subtracting 4 from both sides]

$\Rightarrow \quad x + 0 = -6$ [$\because$ 4 – 4 = 0 and – 2 – 4 = –6]

$\Rightarrow \quad x = -6$ [$\because$ x + 0 = x]

Thus, x = – 6 is the solution of the given equation.

Check : Substituting x = – 6 in the given equation, we get

L.H.S. = – 6 + 4 = – 2 and R.H.S = – 2

Thus,when x = – 6, we have L.H.S. = R.H.S.

5.3 Transposition method

Any term of an equation may be taken from one side to the other with a change in its sign. This does not affect the equality of the statement. This process is called transposition.

Illustrations

Illustration 6. Solve: $\frac{5x-4}{8} - \frac{x-3}{5} = \frac{x+6}{4}$.

Solution We have $\frac{5x-4}{8} - \frac{x-3}{5} = \frac{x+6}{4}$

Multiplying both sides by 40, the LCM of 8, 5 and 4, we get

$5(5x - 4) - 8(x - 3) = 10(x + 6)$

$\Rightarrow \quad 25x - 20 - 8x + 24 = 10x + 60$

$\Rightarrow \quad 17x + 4 = 10x + 60$

$\Rightarrow \quad 17x - 10x = 60 - 4$ [transposing 10x to LHS and 4 to RHS]

$\Rightarrow \quad 7x = 56$

$\Rightarrow \quad x = \frac{1}{7} \times 56 = 8$ [multiplying both sides by $\frac{1}{7}$]

Thus, x = 8 is a solution of the given equation.

Illustration 7. Solve: $x - \left(2x - \frac{3x-4}{7}\right) = \frac{4x-27}{3} - 3$.

Solution We have, $x - \left(2x - \frac{3x-4}{7}\right) = \frac{4x-27}{3} - 3$

Removing the brackets, we get

$\Rightarrow \quad x - 2x + \frac{3x-4}{7} = \frac{4x-27}{3} - 3 \quad \Rightarrow \quad -x + \frac{3x-4}{7} = \frac{4x-27}{3} - 3$

Multiplying both sides by 21, the LCM of 7 and 3, we get

$-21x + 3(3x - 4) = 7(4x - 27) - 63$

$\Rightarrow \quad -21x + 9x - 12 = 28x - 189 - 63$

$\Rightarrow \quad -12x - 12 = 28x - 252$

$\Rightarrow \quad -12x - 28x = -252 + 12$ [by transposition]

$\Rightarrow \quad -40x = -240$

$\Rightarrow \quad x = 6$ [dividing both sides by –40].

x = 6 is a solution of the given equation.

CHECK POST–1

1. Verify by substitution that:

(i) $x = 4$ is the root of $3x - 5 = 7$ (ii) $x = 3$ is the root of $5 + 3x = 14$

(iii) $x = 2$ is the root of $3x - 2 = 8x - 12$ (iv) $x = 4$ is the root of $\frac{3x}{2} = 6$

(v) $y = 2$ is the root of $y - 3 = 2y - 5$ (vi) $x = 8$ is the root of $\frac{1}{2}x + 7 = 11$

2. Solve each of the following equations by trial-and-error method:

(i) $x + 3 = 12$ (ii) $x - 7 = 10$ (iii) $4x = 28$ (iv) $\frac{x}{2} + 7 = 11$

3. Write an equation for each of the following statements:

(i) Twice of a number is 16.

(ii) Sum of 3 and twice of a number is 15.

(iii) Thrice of a number is twice the sum of the number and 1.

4. Solve each of the following equations :

(i) $x - \frac{3}{5} = \frac{7}{5}$ (ii) $3x = 0$ (iii) $7 + 4y = -5$ (iv) $\frac{4}{5} - x = \frac{3}{5}$

5. Solve the following

(i) $5(2x - 3) - 3(3x - 7) = 5$

(ii) $\frac{x}{2} + \frac{x}{4} = \frac{1}{8}$

(iii) $6(3x + 2) - 5(6x - 1) = 3(x - 8) - 5(7x - 6) + 9x$

(iv) $2x - 3 = \frac{3}{10}(5x - 12)$

6. The difference between two numbers is 16. if one third of the smaller number is greater than one seventh of the larger number by 4, then what are the two numbers?

7. The sum of three numbers is 264. If the first number be twice the second and third number be one third of the first, then find the second number?

8. Ram and Rahim have ₹ 60,000 together. If Ram has ₹ 8,000 more than Rahim, then find how much money Ram has.

9. The length of a rectangular field is twice its breadth. If the perimeter of the field is 60 m. Find the length and breadth of the field.

10. I think of a number, multiply it by 6 and subtract 12. The result is 24. What is the number?

GOLDEN KEY POINTS

- A mathematical sentence that can be verified as either true or false is a mathematical statement.
- The equation remains the same if all expressions on L.H.S. are inter changed with those on R.H.S. and vice versa.
- Solutions of linear equation determined by any method are always same.

SOME WORKED OUT ILLUSTRATIONS

Illustration 1.

Verify that y = 9 is the solution of the equation $\frac{y}{3}+5=8$.

Solution

Putting y = 9 in L.H.S. of the given equation, we obtain

L.H.S.= $\frac{9}{3}+5=3+5=8$

and, R.H.S. = 8.

Thus, for y = 9, we have L.H.S. = R.H.S.

Hence, y = 9 is the solution of the given equation.

Illustration 2.

Solve the following equations by the trial-and-error method;

(i) $\frac{x}{8}=9$ (ii) 3x + 4 = 5x – 4

Solution

Let us evaluate the L.H.S. and R.H.S. of each of the given equations for some values of x and continue to give new values till the L.H.S. becomes equal to the R.H.S.

(i) The given equation is $\frac{x}{8}=9$ that is, a number divided by 8 gives 9. This means that the number is

a multiple of 8. We have, L.H.S. = $\frac{x}{8}$ and R.H.S. = 9.

x	L.H.S.	R.H.S.	Is L.H.S. = R.H.S. ?
32	32 / 8 = 4	9	NO
40	40 / 8 = 5	9	NO
48	48 / 8 = 6	9	NO
64	64 / 8 = 8	9	NO
72	72 / 8 = 9	9	YES

Clearly, L.H.S. = R.H.S. for x = 72.

Hence, x = 72 is solution of the given equation.

(ii) The given equation is 3x + 4 = 5x – 4. We have, L.H.S. = 3x + 4 and R.H.S. = 5x – 4.

x	L.H.S.	R.H.S.	Is L.H.S. = R.H.S. ?
1	$3 \times 1 + 4 = 7$	$5 \times 1 - 4 = 1$	NO
2	$3 \times 2 + 4 = 10$	$5 \times 2 - 4 = 6$	NO
3	$3 \times 3 + 4 = 13$	$5 \times 3 - 4 = 11$	NO
4	$3 \times 4 + 4 = 16$	$5 \times 4 - 4 = 16$	YES

Clearly, L.H.S. = R.H.S. for x = 4.

Hence, x = 4 is the solution of the given equation.

Illustration 3.

Solve the equation $\frac{2x}{3}=18$ and check the result.

Solution

We have, $\frac{2x}{3}=18$

$\Rightarrow \quad \frac{2x}{3}\times\frac{3}{2}=18\times\frac{3}{2}$ [Multiplying both sides by $\frac{3}{2}$]

$\Rightarrow \quad \frac{2}{3}\times\frac{3}{2}\times x=27$

$\Rightarrow \quad x = 27$

Thus, x = 27 is the solution of the given equation.

Check : Putting x = 27 in the given equation, we get

L.H.S. $=\frac{2}{3}\times 27=18$ and R.H.S. = 18.

Thus, for x = 27, we have L.H.S.= R.H.S.

Illustration 4.

Solve the equation $2x-\frac{1}{2}=3$ and check the result.

Solution

We have, $2x-\frac{1}{2}=3$

$\Rightarrow \quad 2x-\frac{1}{2}+\frac{1}{2}=3+\frac{1}{2}$ [Adding $\frac{1}{2}$ to both sides]

$\Rightarrow \quad 2x+0=\frac{7}{2}$ [$\because$ 2x + 0 = 2x]

$\Rightarrow \quad \frac{2x}{2}=\frac{7}{2}\times\frac{1}{2}$ [Dividing both sides by 2]

$\Rightarrow \quad x=\frac{7}{4}$

Thus, x = $\frac{7}{4}$ is the solution of the given equation.

Check : Putting $x = \frac{7}{4}$ in the given equation, we get

L.H.S. = $2\times\frac{7}{4}-\frac{1}{2}=\frac{7}{2}-\frac{1}{2}=\frac{6}{2}=3$ and R.H.S. =3

Thus, for x = $\frac{7}{4}$, we have L.H.S. = R.H.S.

Illustration 5.

Solve the equation 3(x + 6) = 21 and check the result.

Solution

We have,

3(x +6) = 21

$\Rightarrow \quad 3x+18=21$ [On expanding the bracket]

$\Rightarrow \quad 3x+18-18=21-18$ [Subtracting 18 from both sides]

$\Rightarrow \quad 3x+0=3$

$\Rightarrow \quad 3x = 3$ $\quad$ [$\because$ 3x + 0 = 3x]

$\Rightarrow \quad \frac{3x}{3} = \frac{3}{3}$ $\quad$ [Dividing both sides by 3]

$\Rightarrow \quad x = 1$

Thus, x = 1 is the solution of the given equation.

Check : Substituting x = 1 in the given equation, we get

L.H.S. = 3 (1 + 6) = 3 × 7 = 21 and R.H.S. = 21

Thus, for x = 1, we have L.H.S. = R.H.S.

Illustration 6.

Solve the equation 16 (3x – 5) – 10 (4x – 8) = 40 and verify the result.

Solution

We have, 16 (3x – 5) – 10 (4x – 8) = 40

$\Rightarrow \quad 16 \times 3x - 16 \times 5 - 10 \times 4x + 10 \times 8 = 40$ $\quad$ [On expanding the brackets]

$\Rightarrow \quad 48x - 80 - 40x + 80 = 40$

$\Rightarrow \quad 48x - 40x - 80 + 80 = 40$

$\Rightarrow \quad 8x + 0 = 40$

$\Rightarrow \quad \frac{8x}{8} = \frac{40}{8}$ $\quad$ [Dividing both sides by 8]

$\Rightarrow \quad x = 5$

Thus, x = 5 is the solution of the given equation.

Check : Substituting x = 5 in the given equation, we get

L.H.S. =16 (3 × 5 – 5) – 10 (4 × 5 – 8) =16 (15 –5) – 10 (20 – 8)

=16 × 10 – 10 × 12 =160 – 120 = 40

and, R.H.S. = 40.

Thus, for x = 5, we have L.H.S. = R.H.S.

Illustration 7.

The sum of a number and 7 is equal to 15. What is the number?

Solution

Let the number be x.

$\therefore \quad x + 7 = 15$ $\quad$ (given)

$x = 15 - 7$ or $x = 8$

Illustration 8.

The sum of three consecutive integers is 10 more than twice the smallest of the integers. Find the integers.

Solution

Let the smallest integer be x.

Then the three integers are x, x + 1, x + 2.

Their sum is x + x + 1 + x + 2 = 3x + 3.

Ten more than twice the smallest integer = 2x + 10.

$\therefore \quad 3x + 3 = 2x + 10$

$3x - 2x = 10 - 3 = 7$

$\therefore \quad x = 7$

$\therefore$ The three integers are 7, 8 and 9.

EXERCISE – 1 ELEMENTARY

1. The solution of the equation $-4 = 2(p - 2)$ is
(A) 0 (B) 1 (C) 2 (D) 4

2. The solution of the equation $0 = 4 + 4(m + 1)$ is
(A) 1 (B) –1 (C) 2 (D) –2

3. If $\frac{x}{6} - 2 = 3$, then x = ?
(A) 20 (B) 30 (C) 11 (D) 15

4. The solution of the equation $x + 3 = 0$ is
(A) 3 (B) –3 (C) 0 (D) 1

5. The solution of the equation $x - 6 = 1$ is
(A) 1 (B) 6 (C) –7 (D) 7

6. The solution of the equation $5x = 10$ is
(A) 1 (B) 2 (C) 5 (D) 10

7. The solution of the equation $\frac{m}{2} = 3$ is
(A) 2 (B) 3 (C) 12 (D) 6

8. The sum of three times x and 10 is 13.
(A) $3x + 10 = 13$ (B) $3x - 10 = 13$ (C) $3x + 13 = 10$ (D) None of these

9. If you subtract 3 from 6 times a number, you get 9.
(A) $3x - 6 = 9$ (B) $6x - 3 = 9$ (C) $6x + 3 = 9$ (D) $3x + 6 = 9$

10. One fourth of n is 3 more than 2.
(A) $\frac{n}{4} - 2 = 3$ (B) $\frac{n}{4} + 2 = 3$ (C) $\frac{n}{2} - 4 = 3$ (D) $\frac{n}{2} + 4 = 3$

11. One third of a number plus 2 is 3.
(A) $\frac{m}{3} - 2 = 3$ (B) $\frac{m}{3} + 2 = 3$ (C) $\frac{m}{2} - 3 = 3$ (D) $\frac{m}{2} + 3 = 3$

12. Taking away 5 from x gives 10.
(A) $x - 5 = 10$ (B) $x + 5 = 10$ (C) $x - 10 + 5$ (D) None of these

13. Four times a number p is 8.
(A) $4p = 8$ (B) $p + 4 = 8$ (C) $p - 4 = 8$ (D) $p \div 4 = 8$

14. Add 1 to three times x to get 7.
(A) $3x + 1 = 7$ (B) $3x - 1 = 7$ (C) $3x + 7 = 1$ (D) None of these

15. The number b divided by 6 gives 5.
(A) $\frac{b}{6} = 5$ (B) $b - 5 = 6$ (C) $5b = 6$ (D) $b + 5 = 6$

16. If $(2n + 5) = 3(3n - 10)$, then $n = ?$
(A) 5 (B) 3 (C) $\frac{2}{5}$ (D) $\frac{2}{3}$

17. If $\frac{x-1}{x+1} = \frac{7}{9}$, then $x = ?$
(A) 6 (B) 7 (C) 8 (D) 10

18. If $8(2x - 5) - 6(3x - 7) = 1$, then $x = ?$
(A) 2 (B) 3 (C) $\frac{1}{2}$ (D) $\frac{1}{3}$

19. If $4x - 9 = 11 + 2x$, then $x = ?$
(A) 6 (B) –2 (C) 5 (D) 10

20. If $x - 1 = 9$ and $3y = 9$, then $\frac{y}{x} = ?$
(A) 3.33 (B) 0.3 (C) 2.66 (D) 3

21. $x - 6 = -6$ has a solution in ____________.
(A) Integers (B) Whole numbers (C) Natural Numbers (D) Both A and B

22. On adding 9 to the twice of a whole number gives 31. The whole number is
(A) 21 (B) 16 (C) 17 (D) 11

23. Thrice a number when increased by 6 gives 24. The number is
(A) 6 (B) 7 (C) 8 (D) 11

24. Find the solution of the equation $\frac{m}{11} = -8$
(A) 88 (B) –19 (C) –88 (D) 44

25. If x is the solution of the equation $4x = 12$, then the value of $3x - 9 = ?$
(A) 135 (B) 0 (C) 15 (D) 6

EXERCISE – 2 SEASONED

1. If x – 5 = 10, then x = ?

(A) 15 (B) 5 (C) –5 (D) 20

2. A number when multiplied by 5 is increased by 80. The number is

(A) 15 (B) 20 (C) 25 (D) 30

3. $\frac{2}{3}$ of a number is less than itself by 10. The original number is

(A) 30 (B) 36 (C) 45 (D) 60

4. The sum of two consecutive whole numbers is 53. The smaller number is

(A) 25 (B) 26 (C) 29 (D) 23

5. The sum of two consecutive even numbers is 86. The larger of the two is

(A) 46 (B) 36 (C) 38 (D) 44

6. The sum of two consecutive odd numbers is 36. The smaller one is

(A) 15 (B) 17 (C) 19 (D) 13

7. The length of a rectangle is three times its width and its perimeter is 96 m. The length is

(A) 12 m (B) 24 m (C) 36 m (D) 48 m

8. If $5x - \frac{3}{4} = 2x - \frac{2}{3}$, then x = ?

(A) $\frac{1}{12}$ (B) $\frac{1}{4}$ (C) 36 (D) $\frac{1}{36}$

9. If $2z + \frac{8}{3} = \frac{1}{4}z + 5$, then z = ?

(A) 3 (B) 4 (C) $\frac{3}{4}$ (D) $\frac{4}{3}$

10. If $\frac{x}{2} - 1 = \frac{x}{3} + 4$, then x = ?

(A) 8 (B) 16 (C) 24 (D) 30

11. If $\frac{2x-1}{3} = \frac{x-2}{3} + 1$, then x = ?

(A) 2 (B) 4 (C) 6 (D) 8

12. The present ages of A and B are in the ratio 5 : 3. After 6 years, their ages will be in the ratio 7 : 5. The age of A is

(A) 5 years (B) 10 years (C) 15 years (D) 20 years

13. Find two consecutive natural numbers whose sum is 63.

(A) 25, 26 (B) 31, 32 (C) 41, 42 (D) 28, 29

14. The perimeter of an equilateral triangle whose side is $(2x + 3)$ units is 21 units. Then $x = ?$

(A) 2 (B) 1 (C) 4 (D) 3

15. A can complete the work in 4 days and they together can complete the same work in 2 days. How many days does B take to complete the work ?

(A) 6 (B) 3 (C) 4 (D) 2

EXERCISE – 3 SUBJECTIVE

Very short answer type questions

1. Solve the following equations by transposition. Check your answer.

(i) $x+\frac{3}{5}=\frac{4}{5}$ (ii) $x - 4.2 = 11.4$ (iii) $n-\frac{3}{8}=\frac{1}{8}$

2. Solve each equation. Check your answer.

(i) $\frac{j}{7}=5$ (ii) $\frac{w}{-8}=-4$ (iii) $\frac{4y}{5}=\frac{1}{20}$

3. Solve each of the following equation

(i) $m - (-4) = 9$ (ii) $0.5x + 2.1 = 5.6$ (iii) $3x+\frac{1}{2}=1$ (iv) $\frac{z}{6}-\frac{5}{8}=\frac{7}{8}$

Short answer type questions

4. If $\frac{5m-2}{2}=-11$, find the value of $2m + 3$.

5. Frame equations for the following

(i) 6 times a number added to 10 is 58.

(ii) A number decreased by 10 is 40.

(iii) A number increased by 8 is equal to 48.

(iv) A number is 4 times another number. Their sum is 30.

(v) A number is 8 times another number. Their difference is 42.

(vi) Half of a number is 21 less than twice the number.

(vii) A book costs twice that of a pen. The pen and the book together cost ₹ 48.

True or False

6. $p = 3$ is a solution of the equation $4p - 3 = 13.1$

7. The equation representing the statement "15 less than three times a number gives 3" is $15-3x=13$.

Fill in the blanks

8. Any value of the variable which makes both sides of an equation equal, is known as a _______ of the equation.

9. The value of p which satisfies $\frac{4p}{5}+1=9$ is _______.

Long answer type questions

10. Solve the following equations

(i) $3x + 2(x + 2) = 20 - (2x - 5)$

(ii) $13(y - 4) - 3(y - 9) - 5(y + 4) = 0$

(iii) $\frac{2m+5}{3} = 3m - 10$

(iv) $t - (2t + 5) - 5(1 - 2t) = 2(3 + 4t) - 3(t - 4)$

(v) $\frac{2}{3}x = \frac{3}{8}x + \frac{7}{12}$

(vi) $\frac{3x-1}{5} - \frac{x}{7} = 3$

(vii) $\frac{y-1}{3} - \frac{y-2}{4} = 1$

(viii) $\frac{x-2}{4} + \frac{1}{3} = x - \frac{2x-1}{3}$

11. Sumitra has ₹ 34 in 50-paise and 25-paise coins. If the number of 25-paise coins is twice the number of 50-paise coins, how many coins of each kind does she have?

12. The present ages of Sonal and Manoj are in the ratio 7 : 5. Ten years hence, the ratio of their ages will be 9 : 7. Find their present ages.

13. The total cost of 3 tables and 2 chairs is ₹ 1850. If a table costs ₹ 75 more than a chair, find the price of each.

High order thinking skills (HOTS)

14. People of Vrindavn planted a total of 102 trees along the village road. Some of the trees were fruit-bearing trees. The number of non-fruit-bearing trees was two more than thrice the number of fruit-bearing trees. What was the number of fruit-bearing trees planted ?

15. Soumya works in an electronics showroom which sells TV sets. Her base salary is ₹ 10,000 per month. Soumya also gets an incentive of ₹ 240 on every TV set she sells. Find the number of TV sets she should sell in order to earn ₹ 14,320 next month.

ANSWERS

CHECK POST-1

2. **(i)** 9 **(ii)** 17 **(iii)** 7 **(iv)** 8

3. **(i)** $2x = 16$ **(ii)** $2x + 3 = 15$ **(iii)** $3x = 2(x+1)$

4. **(i)** 2 **(ii)** 0 **(iii)** -3 **(iv)** $\frac{1}{5}$

5. **(i)** $x = -1$ **(ii)** $x = \frac{1}{6}$ **(iii)** $x = -1$ **(iv)** $x = \frac{-6}{5}$

6. 33, 49 **7.** 72 **8.** ₹ 34,000

9. Length = 20 m, breadth = 10 m **10.** 6

EXCERCISE-1

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	A	D	B	B	D	B	D	A	B	A
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	B	A	A	A	A	A	C	C	D	B
Que.	21	22	23	24	25					
Ans.	D	D	A	C	B					

EXCERCISE-2

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	A	B	A	B	D	B	C	D	D	D
Que.	11	12	13	14	15					
Ans.	A	C	B	A	C					

EXCERCISE-3

1. **(i)** $x = \frac{1}{5}$ **(ii)** $x = 15.6$ **(iii)** $n = \frac{1}{2}$

2. **(i)** $j = 35$ **(ii)** $w = 32$ **(iii)** $y = \frac{1}{16}$

3. **(i)** $m = 5$ **(ii)** $x = 70$ **(iii)** $x = \frac{1}{6}$ **(iv)** $z = 9$ **4.** -5

5. **(i)** $6x + 10 = 58$ **(ii)** $x - 10 = 40$ **(iii)** $x + 8 = 48$ **(iv)** $x + 4x = 30$

(v) $8x - x = 42$ **(vi)** $\frac{x}{2} = 2x - 21$ **(vii)** $x + 2x = 48$

6. False **7.** False **8.** Solution **9.** 10

10. **(i)** $x = 3$ **(ii)** $y = 9$ **(iii)** $m = 5$ **(iv)** $t = 7$ **(v)** $x = 2$

(vi) $x = 7$ **(vii)** $y = 10$ **(viii)** $x = -6$ **11.** 34, 68

12. 35 years, 25 years **13.** cost of 1 table = ₹ 400, cost of 1 chair = ₹ 325

14. 25 fruit-bearing trees **15.** 18 TV sets

* * * * *